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Assessing the sources of risk and risk management strategies surrounding poverty traps and mangrove ecosystem services in rural coastal Tanzania

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Introduction

In developing countries, poor and vulnerable populations rely heavily on surrounding natural resources for their livelihoods. At the same time, many of them lack any means to effectively manage risks - such as credit or insurance. As a result, any exogenous shocks, like flooding or hurricanes, could destroy natural assets and consequently reinforce the mechanisms that cause poverty to persist. This study explores the extent to which ecosystem services from mangroves could provide benefits that could directly aid in alleviating sources of poverty traps. Research findings will be used to identify the most common sources of risk and risk management strategies, and aid in gaining a preliminary understanding of which mangrove ecosystem services would be most directly associated with alleviating sources of poverty traps. We selected communities in rural coastal Tanzania as our study site due to their high rates of poverty, significant mangrove degradation and frequent exposure to storm surge.

Research objectives include:

- To assess the most common sources of risk and risk management techniques
- To assess variation in coping strategies among different demographics such as gender, age, household size and access to support networks
- To form preliminary observations of mangrove ecosystem services that could directly correlate with poverty trap alleviation

Methods

To acquire the most relevant information, we constructed a survey instrument that required respondents to provide

- basic household information and demographics
- mangrove use
- fishing and shrimping practices
- long-term and medium shocks and coping mechanisms
- ability to cope, and
- access to markets

In order to select the specific study site, GIS and historical flood data were utilized to pinpoint areas that were most prone to flooding and storm surge. With this information, a formal pre-test was conducted in one village – as a way to better understand the accuracy and effectiveness of the instrument. After the pre-test was complete, the instrument was finalized and prepared for distribution. We implemented the survey in fifteen rural coastal villages in northern Tanzania. In each village, we surveyed ten randomly-selected households, resulting in a sample size of 150 households. After field work was complete, survey data was entered and coded into Excel.

Results

Preliminary findings suggest that over the last twenty years, these communities have been most affected by the large decline in fish, drinking water, shrimp and mangroves. They are also quite vulnerable to drought, coastal erosion, coastal flooding, hurricanes and salt water intrusion on their crops. Over half of these households were affected by decline in fish populations, and a little under half were affected by sharp declines in drinking water. As a result, risk management strategies in response to these two shocks are analyzed below.

In response to a sharp decline in fish populations, over half the households spent more effort to extract the resource, reduced their household consumption of fish, or switched to a substitute natural resource. Similarly, households spent more effort extracting fresh drinking water or reduced their household consumption – in response to an increase in drinking water scarcity. It is also important to note that many households believed both of these environmental shocks are out of their control and consequently took no action to remediate them. As displayed above, smaller households tend to switch to a substitute natural resource, reduce household consumption or spend more time extracting the resource than larger ones – in response to fish decline. Similarly, smaller households spent more effort to extract the resource than larger households. Varying coping strategies among other demographics – such as age and gender – were also analyzed, but not included here.

Discussion

Sources of risk and risk management strategies. By observing the most common sources of risk and consequent coping strategies, it is clear that these communities are heavily influenced by their surrounding natural resources. Without enough fish, shrimp and fresh drinking water, for example, these communities lose access to both food and productive assets. When coping with these declines, they have to spend more effort to get the resource, use less of it, or switch to another resource – all of which are not sustainable. Eventually, it will become too difficult to extract the resource, and any other surrounding resources they may switch to will become degraded. It is therefore essential to understand how these specific shocks correlate to mangrove ecosystem services. The most prevalent long term shocks were similar to what we hypothesized. In the field, decline in fish and increasing salt percolation into local wells were evident. Other shocks, such as drought, decline in shrimp and mangroves, and coastal erosion were also commonly observed**.**

Varying coping strategies among different demographics. The differences in coping strategies among different household sizes were not what we necessarily hypothesized. As household size increases, the relative proportion of different coping strategies stays relatively the same. Initially, hypotheses predicted that larger household size would result in more labor-intensive coping strategies. It seems common, however, that smaller households engage in labor intensive strategies as well – such as spending more effort extracting the resource. Furthermore, despite smaller or medium sized households tending to spend more effort extracting the resource or reducing their household consumption, it is difficult to get a definite correlation between these two variables without a larger sample of households, or further analysis on coping strategies in response to all other types of shocks.

Preliminary observations of mangrove ecosystem services that could directly correlate to poverty trap alleviation. By looking at the most common sources of risk and risk management techniques, it is clear that some of the ecosystem services that mangroves can provide have the potential to help remediate

the effect of these shocks. For example, mangroves provide nursery habitat to both fish and shrimp – and therefore could play a role in restoring habitat for these species and eventually increasing these populations. Mangroves also play a role in reducing coastal erosion, and reducing the effects of storm surge and coastal flooding. In addition to reducing shocks, ecosystem services from mangroves could potentially effect risk management strategies, as well. If surrounding resources are more protected – then households would be able to switch to another resource more easily, as it may not be as degraded. Additionally, individuals would not have to spend as much energy continuously extracting a single resource – as the impact of these shocks would be lessened. With these shocks continuously affecting these communities, mangrove ecosystem services could potentially provide benefits and protect productive assets. Overtime, synergistic improvement in economic development and mangrove restoration could occur.

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